

DETAILED ACTION

Claim Objections

1. Claims 59, 81 and 101 are objected to in because the letter “n” in Sn should be subscripted to avoid confusion with the element tin (Sn).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 47-51, 53, 56, 61, 64-70, 72-75, 77, 79, 83, 86-89 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukumoto et al. (EP 678 549).

The reference discloses a crosslinkable composition comprising vulcanized 60-mesh rubber particles treated with vinyl triethoxysilane, polybutadiene and natural rubber, carbon black and sulfur; the composition is then crosslinked and made into a tread and tire (see Tables 1, 2 and 3, as well as page 3, line 43 through page 7). Examples B through I are stated to correspond to the examples of the invention (see page 4, last line). Although the reference method includes vulcanization of the initial mixture comprising rubber and silane coupling agent, some silane compound will necessarily remain unreacted on the surface of the resulting pulverized powder, at least

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within the broad scope of being "surface treated with at least one silane coupling agent."

It is furthermore noted that the reference authors have stated that when the coupling agent is used in amounts greater than 8 phr, "unreacted silane is deposited on the surface of the vulcanized rubber powder" (page 3, lines 5-6), and therefore at least the composition and tire which includes the rubber powder of Example H is expressly within the claimed scope (see Example H of Table 1, and Example 10 of Table 3).

Regarding claims 53, 56, Examples H and 10 have used natural rubber as the subdivided rubber component, which would be expected to have cis-1,4- and/or 3,4-polyisoprene component.

Regarding claim 70, optional use of silica is recommended at page 2, lines 53-55.

Regarding claim 74, official notice is taken that the structure of the recited tire is merely a conventional automobile tire, and would correspond to the automobile tire stated in the reference examples.

Regarding claims 64, 65 and 86, since reference Example H includes 10 phr silane in the vulcanized rubber powder, and the authors also state that quantities above 8 phr result in residual unreacted silane on the vulcanized powder surface, it would appear that the residual surface amount would inherently fall within the range of 2% - 30% (corresponding to applicants' claimed range of 0.2 - 3% by weight. The burden of proof is shifted to applicants to show otherwise.

4. Claims 52, 54, 55, 57-59, 62, 63, 76, 78, 80, 81, 84, 85, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto et al. (EP 678 549).

The parent claims are discussed with respect to this reference above.

Regarding claims 52 and 76, the reference states that the rubber powder may be present in amounts as low as 30 phr (see page 3, lines 20-21).

Regarding claim 54 and 78, inclusion of styrene/butadiene rubber in the powder composition would be obvious because its use is recommended at page 2, lines 42-44.

Regarding claim 57 and 80, inclusion of styrene/butadiene rubber in the elastomeric polymer would be obvious because its use is recommended at page 3, lines 18-19.

Regarding claims 55 and 58, inclusion of other conventional diene rubbers such as ethylene/propylene/diene or butyl rubber would be obvious because addition of other diene rubbers is recommended at page 2, lines 42-44 and page 3, lines 18-19.

Regarding claim 59 and 81, these alternative embodiments are disclosed in the paragraph bridging pages 2-3.

Regarding claims 62 and 84, these alternative embodiments would be obvious in view of the line bridging pages 2-3 because the reference recommends that the silane be X_3SiR , wherein X is alkoxy or chlorine and R is a mercapto group (see page 2, last two lines).

Regarding claims 63 and 85, selection of glycidoxypolytrimethoxysilane would be obvious because the reference recommends that the silane be X_3SiR , wherein X is alkoxy and R is a glycidoxy group (see page 2, last two lines);

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glycidoxypolytrimethoxysilane would be an obvious selection within such a scope because it is among the most common glycidoxysilane compounds for use in functionalizing/coupling of rubber compositions.

5. Claims 90-101, 103-107 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto et al. (EP 678 549).

The reference discloses a crosslinkable composition comprising vulcanized 60-mesh rubber particles treated with vinyl triethoxysilane, polybutadiene and natural rubber, carbon black and sulfur. The composition is then crosslinked and made into a tread and tire (see Tables 1, 2 and 3, as well as page 3, line 43 through page 7). Examples B through I are stated to correspond to the examples of the invention (see page 4, last line). Although the reference method includes vulcanization of the initial mixture comprising rubber and silane coupling agent, some silane compound will necessarily remain unreacted on the surface of the resulting pulverized powder, at least within the broad scope of being "surface treated with at least one silane coupling agent." It is noted that the reference authors have stated that when the coupling agent is used in amounts greater than 8 phr, "unreacted silane is deposited on the surface of the vulcanized rubber powder" (page 3, lines 5-6), and therefore at least the composition and tire which includes the rubber powder of Example H is expressly within the claimed scope (see Example H of Table 1, and Example 10 of Table 3).

The reference does not expressly state the order of combining the components of Table 2, or the reaction times/temperatures for the crosslinking process which makes

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the tread composition and tire. Therefore, any conventional parameters and sequence would be obvious selections, including those of claims 90-97. After making the treated rubber particles, it would be obvious to combine same with the elastomer polymer and then add the sulfur compound for efficient mixing of the reactive components with the bulk rubber components. Regarding times/temperatures, the treated rubber powders of the reference were vulcanized at 140-180°C for 10-40 minutes, and these values are seen as conventional for vulcanization/functionalization of rubber compositions; therefore, the ranges of claims 91-95 would be obvious selections. Regarding claims 96 and 97, it would be obvious to add the sulfur compound at a slower rate and/or decreased temperature for the purpose of effective mixing and a controlled crosslinking reaction.

Regarding claim 100, inclusion of styrene/butadiene rubber in the elastomeric polymer would be obvious because its use is recommended at page 3, lines 18-19.

Regarding claim 101, these alternative embodiments are disclosed in the paragraph bridging pages 2-3.

Regarding claim 104, these alternative embodiments would be obvious in view of the line bridging pages 2-3 because the reference recommends that the silane be X_3SiR , wherein X is alkoxy or chlorine and R is a mercapto group (see page 2, last two lines).

Regarding claim 105, selection of glycidoxypolytrimethoxysilane would be obvious because the reference recommends that the silane be X_3SiR , wherein X is alkoxy and R is a glycidoxy group (see page 2, last two lines);

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glycidoxypyltrimethoxysilane would be an obvious selection within such a scope because it is among the most common glycidoxysilane compounds for use in functionalizing/coupling of rubber compositions.

Regarding claim 106, since reference Example H includes 10 phr silane in the vulcanized rubber powder, and the authors also state that quantities above 8 phr result in residual unreacted silane on the vulcanized powder surface, it would appear that the residual surface amount would inherently fall within the range of 1% - 50% (corresponding to applicants' claimed range of 0.1 - 5% by weight. The burden of proof is shifted to applicants to show otherwise.

6. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto et al. (EP 678 549) in view of Datta et al. (US 20020151640).

The parent claims are discussed with respect to Fukumoto above. The use of a silica coupling agent would be obvious because Fukumoto suggests using silica, and a coupling agent is typically used therewith, as disclosed in Data (see [0006]).

7. Claims 60, 82 and 102 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberto Rábago whose telephone number is (571) 272-1109. The examiner can normally be reached on Monday - Friday from 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roberto Rábago/
Primary Examiner
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RR
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